Supplement to Wir
Electrical Trader, 9 Febr

"TRADER" SERVICE SHEET
1287

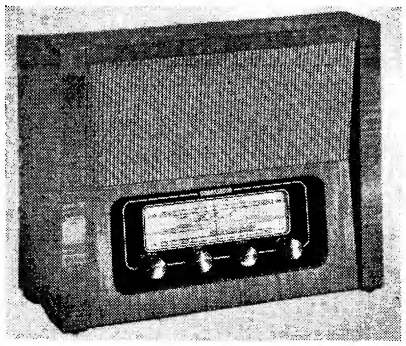
AMBASSADOR AFM/TM

Covering Table Model AFM/TM, Console Model AFM Bookshelf Auto-radiogram Models AFM Radiogram, CRG/AFM, PRG/AFM

THE Ambassador AFM/TM is a 5-valve (plus rectifier) 3-band A.M./F.M. table receiver, designed to operate from A.C. mains of 200-250 V, 50 c/s. The band ranges are: A.M., 180-550m and 1,000-2,000m; F.M., 88-100 Mc/s.

The AFM Bookshelf is a console receiver, and the CRG/AFM, PRG/AFM, Consort and AFM Radiogram are 3-speed auto-radiograms. All models employ an AFM/TM chassis.

Release dates and original prices: AFM/TM, *May* 1955, £19 11*s* 4*d*; *AFM Bookshelf, May* 1955, £26 1*s* 9*d*; *CRG/AFM, February* 1956, £52 3*s* 6*d*; *PRG/AFM, February* 1956, £57 15*s* 9*d*; *Consort, June* 1956, £38 0*s* 11*d*; *AFM Radiogram, May* 1955, £47 16*s* 6*d*. *Purchase tax extra.*



Appearance of the Ambassador AFM/TM.

CIRCUIT DESCRIPTION

A.M. aerial input is coupled to the aerial tuning circuits by **L10** (M.W.) and by the common impedance of **C18** (L.W.). I.F. rejection in the aerial input circuit by **L9, C17.** **V2b** operates as A.M. mixer and **V2a** operates as local oscillator.

Oscillator grid coils **L13** (M.W.) and **L14** (L.W.) are tuned by **C27.** Parallel trimming by **C28** (M.W.) and **C29, C30** (L.W.); series tracking by **C33** (M.W.) and **C32, C33** (L.W.). Reaction coupling from oscillator anode via **L15** and the common impedance of trackers **C32, C33.**

V3 is a variable-mu R.F. pentode operating as A.M. intermediate frequency amplifier with tuned transformer couplings **L18, L19** and **L23, L24.**

A.M. intermediate frequency 470 kc/s.

Diode section **C** of **V4** operates as signal detector. Audio frequency component in its rectified output is developed across **R19** and is passed via **R21, C52,** volume control **R22** and **C53** to **V4d** which operates as A.F. amplifier. I.F. filtering by **C47, R16, C48, R21, C51.**

D.C. component developed across **R19** is fed back as bias to **V2b** and **V3** giving automatic gain control on the A.M. bands.

Provision is made for the connection of a gramophone pick-up across the volume control circuit via **S19** which closes in the gram position of the band switch. **S11, S14** and **S15** close and **S18** opens in this position to prevent radio breakthrough.

Resistance-capacitance coupling by **R25, C56, R26, R27,** between **V4d** and pentode output valve **V5.** Variable tone control in **V5** control grid circuit by **C57, R28.** Tone correction in **V5** anode circuit by **C58.**

H.T. current is supplied by I.H.C. full-wave rectifier **V6.** Smoothing by **R31, L27** and electrolytic capacitors **C60, C61, C63.**

Operation on F.M.

80Ω co-axial F.M. aerial input via **L1, L2** to earthed grid R.F. amplifier, section **a** of **V1.** **V1b** operates as oscillator/mixer valve with tuned oscillator anode circuit **L5, C11, C12, C13, C14.** Reaction coupling from oscillator grid circuit via **L4.**

Output of **V1a** is coupled via R.F. tuning circuit **L3, C4, C5, C6** and a tapping on **L4** to **V1b.** Oscillator radiation is kept to a minimum by means of a bridge neutralizing circuit, formed by **L4, C9** and the grid/cathode capacitance of **V1b,** which prevents oscillator voltages from passing back into the R.F. and aerial circuits.

F.M. tuning is by means of **C5** and **C12** which are parts of the main tuning gang.

V2b and **V3** form the two-valve F.M. intermediate frequency amplifier, which is coupled by tuned transformers **L7, L8; L16 L17;** and discriminator transformer **L20, L21, L22** to diode sections **a** and **b** of **V4** connected in a ratio detector circuit.

F.M. intermediate frequency 10.7 Mc/s.

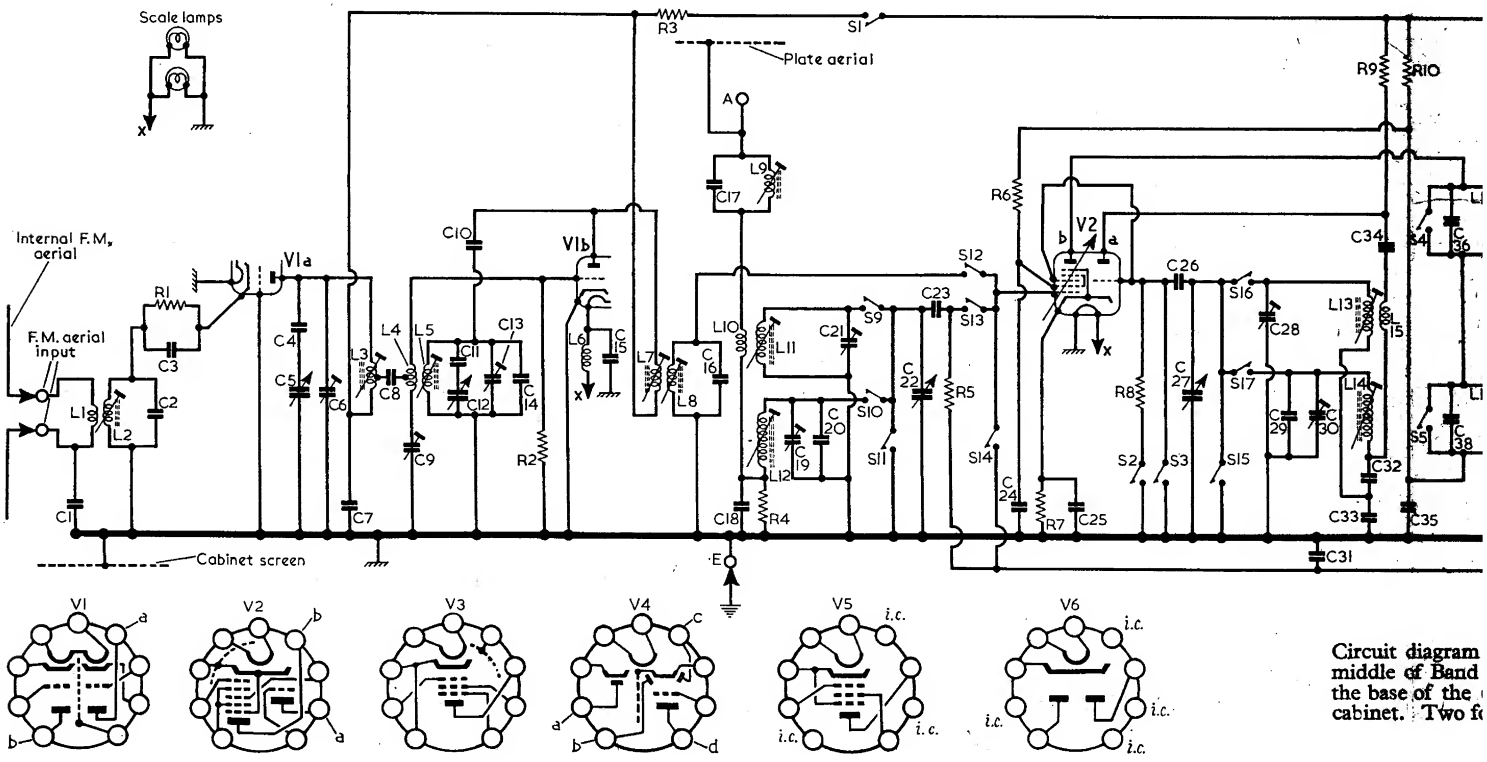
The A.F. output of the ratio detector is developed across A.F. load **C44** and is passed via de-emphasis circuit **R15, C50, R18** to the volume control circuit. Limiting is by means of the flywheel effect of D.C. reservoir capacitor **C49.**

MODIFICATIONS

The following modifications occur in later models than the sample receiver from which this *Service Sheet* was prepared.

V2b.—A 2pF capacitor is connected between **V2b** control grid and the junction of **R6, R10. C35** is 0.001μF and is returned to **V2b** cathode instead of to chassis.

V3.—A spare contact on the slide-type A.M./



Circuit diagram
middle of Band
the base of the
cabinet. Two f

M/TM Series

AFM Bookshelf, and 3-speed AFM, PRG/AFM and Consort

F.M. switch unit is used to shunt an 0.005μF capacitor across **C40** on A.M. operation. This additional switch is identified as **S22** in location reference G4 in the underside view of the chassis. **C40** is 0.002μF. **R11** is connected directly to H.T. positive. **C42** is 0.01μF and is returned to **V3** screen grid instead of to cathode.

Tone Control Circuit.—**C57** is omitted and **R28** is connected, via a 460pF or a 500pF capacitor to **V5** anode. The top of **R28** is also connected via a 470kΩ resistor to **R26, R27. C58** is 0.002μF.

Discriminator Circuit.—**R18** is omitted. **C50** is 0.001μF and is connected between **R15, S7** and chassis. **R20** is 22kΩ.

H.T. Circuit.—**L27** is connected to the junction of **C60, R31** instead of to the junction of **R31, C61.**

AFM Bookshelf.—In later versions of this model, a 470kΩ resistor is connected in series between **C52** and **R22** and a 625pF capacitor and a 330KΩ resistor connected in series are shunted from the top of **R22** to chassis.

Earlier Versions

The following differences occur in earlier models than our sample receiver.

R6 was connected direct to H.T. positive. **R18** was omitted. **C50** was 300pF and was connected direct to chassis. A 47kΩ resistor was connected between **R15, C50** and **S7. C62** was omitted.

GENERAL NOTES

Switches.—**S1-S8** are the A.M./F.M. change-over switches ganged in a slide-type unit beneath the chassis. The switch contacts on this unit are identified in the underside illustration of the chassis (location references F4, G4, H4). Switches **S2, S4** and **S8** close for A.M. operation, and switches **S1, S3, S5, S6** and **S7** close for F.M. operation.

S9-S19 are the band/gram switches ganged in a single rotary unit beneath the chassis. This

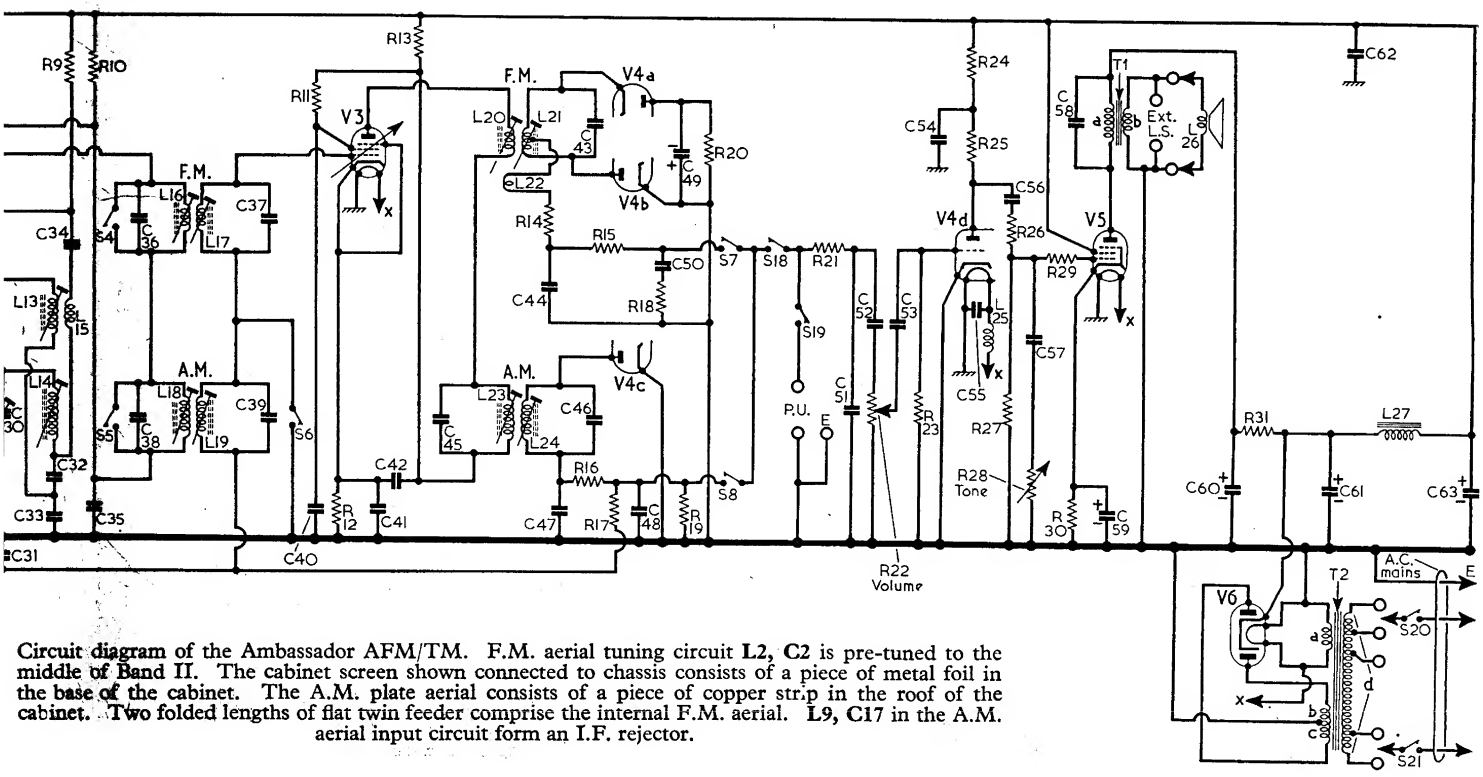
(*Continued column 1 overleaf*)

COMPONENT VALUES AND LOCATIONS

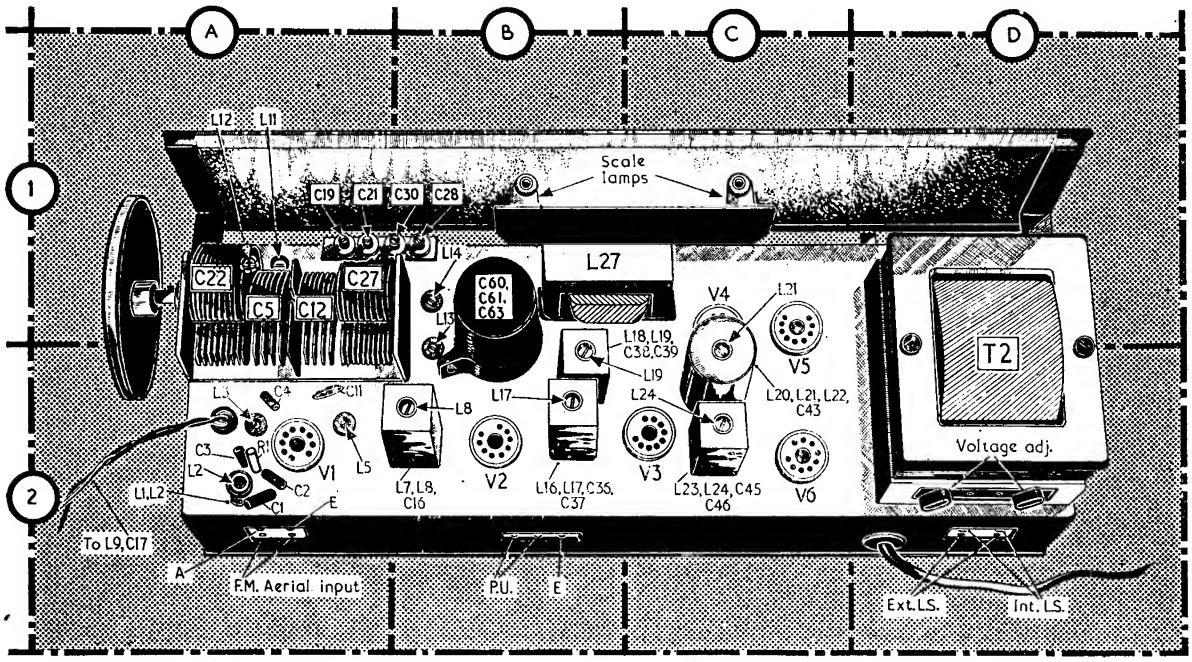
Capacitors		
C1[1]	0·003μF	A2
C2	6pF	A2
C3	0·002μF	A2
C4	50pF	A2
C5	—	A1
C6	—	J4
C7	500pF	J4
C8	50pF	J4
C9	—	J4
C10	15pF	J4
C11	50pF	A2
C12	—	A1
C13	—	J4
C14	6pF	J4
C15	0·002μF	J4
C16	15pF	B2
C17	500pF	A2
C18	2,400pF	J3
C19	—	A1
C20	60pF	J3
C21	—	A1
C22	—	A1
C23	100pF	H4
C24	0·05μF	H4
C25	0·05μF	H4
C26	100pF	H4
C27	—	A1
C28	—	B1
C29	140pF	H3
C30	—	B1
C31	0·1μF	G3
C32	300pF	H3
C33	550pF	H3
C34	100pF	H3
C35	0·01μF	H4
C36	15pF	B2
C37	15pF	B2
C38	175pF	B2
C39	175pF	B2
C40	0·01μF	G4
C41	0·01μF	G4
C42	0·003μF	G4
C43	30pF	C2
C44	300pF	F4
C45	175pF	C2
C46	175pF	C2
C47	100pF	G4
C48	100pF	F4
C49	2μF	G3
C50	1,500pF	F4
C51	100pF	G3
C52	0·01μF	G3
C53	0·02μF	F3
C54	0·1μF	G3
C55	0·002μF	G3
C56	0·05μF	G3
C57	0·01μF	F3
C58	0·001μF	F4
C59	25μF	F4
C60	32μF	B1
C61	16μF	B1
C62	0·002μF	H3
C63	32μF	B1
Resistors		
R1	220Ω	A2
R2	1MΩ	J4
R3	2·2kΩ	H4
R4	10kΩ	J3
R5	470kΩ	H4
R6	39kΩ	H4
R7	180Ω	H4
R8	47kΩ	H4
R9	39kΩ	H4
R10	2·2kΩ	H4
R11	68kΩ	G4
R12	150Ω	G4
R13	2·2kΩ	G4
R14	1·2kΩ	F3
R15	47kΩ	F4
R16	47kΩ	F4
R17	1·5MΩ	G4
R18	22kΩ	F4
R19	470kΩ	F4
R20	56kΩ	G3
R21	47kΩ	H3
R22	1MΩ	G3
R23	10MΩ	G3
R24	150kΩ	G3
R25	100kΩ	G3
R26	56kΩ	F3
R27	470kΩ	F3
R28	50kΩ	F3
R29	56kΩ	F3
R30	220Ω	F4
R31	120Ω	F4
Other Components		
L1	—	A2
L2	—	A2
L3	—	J4
L4	—	J4
L5	—	J4
L6	—	H4
L7	—	B2
L8	—	B2
L9	3·0	A2
L10	8·0	J3
L11	3·0	J3
L12	25·0	J3
L13	2·0	H3
L14	5·0	H3
L15	—	H3
L16	—	B2
L17	—	B2
L18	10·0	B1
L19	10·0	B1
L20	2·0	C2
L21	—	C2
L22	—	C2
L23	10·0	C2
L24	10·0	C2
L25	—	F3
L26	2·5	—
L27	400·0	B1
T1 a	430·0	E3
T1 b	0·5	E3
T2 a	—	D1
T2 b	190·0	D1
T2 c	200·0	D1
T2 d	43·0	D1
S1-S8	—	G4
S9-S19	—	H4
S20, S21	—	F3

[1]May be 0·001μF. [2]Approximate D.C. resistance in ohms.

If component numbers given in the table above are quoted when ordering replacement parts, the fact should be mentioned on the order, as these numbers may differ from those used by the manufacturers.



Circuit diagram of the Ambassador AFM/TM. F.M. aerial tuning circuit **L2, C2** is pre-tuned to the middle of Band II. The cabinet screen shown connected to chassis consists of a piece of metal foil in the base of the cabinet. The A.M. plate aerial consists of a piece of copper strip in the roof of the cabinet. Two folded lengths of flat twin feeder comprise the internal F.M. aerial. **L9, C17** in the A.M. aerial input circuit form an I.F. rejector.



Plan illustration of the chassis. The A.M. I.F. filter **L9, C17,** whose leads are indicated in location A2, are mounted in the cabinet.

General Notes—*Continued*

unit is indicated in the underside illustration of the chassis (location reference J4), and is shown in detail in the diagram in this col. where it is drawn as viewed from the rear of an inverted chassis. The associated switch table gives the switch operations in the four control settings, starting with the control turned fully anti-clockwise. A dash indicates open, and **C**, closed.

Scale Lamps.—These are 6.3 V, 0.3 A lamps, with small clear spherical bulbs and M.E.S. bases.

Drive Cord Replacement.—About 55in of nylon-braided glass yarn is required for a new drive cord. It should be run as indicated in the sketch of the tuning drive system at the head of columns 5 and 6, starting with the gang at maximum capacitance and tying the cord to the lug on the drum as shown.

VALVE ANALYSIS

Valve voltages and currents in the table (next col.) are those measured on our sample receiver when it was operating from A.C. mains of 240 V, with the voltage adjustment plugs set to the appropriate tappings. The gang was tuned to maximum, and, except where otherwise indicated, the receiver was switched to F.M. There was no signal input.

Valve voltages were measured with an Avo Electronic Testmeter, and as this instrument has a high internal resistance, allowance should be made for the current drawn by other types of meter. Chassis was the negative connection in every case.

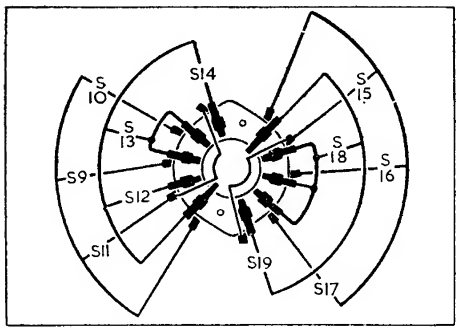
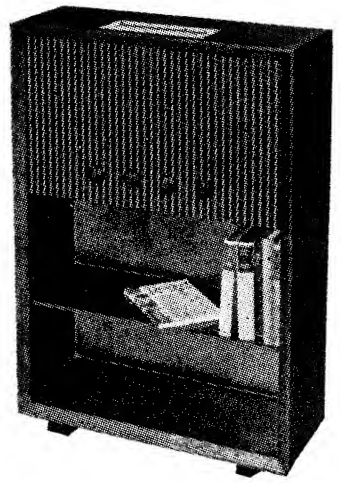


Diagram of the band/gram switch unit as seen from the rear. Below is the associated switch table.

Switches	Gram.	L.W.	M.W.	F.M.
S9	—	—	C	—
S10	—	C	—	—
S11	C	—	—	C
S12	—	—	—	C
S13	—	C	C	—
S14	C	—	—	—
S15	C	—	—	C
S16	—	—	C	—
S17	—	C	—	C
S18	—	C	C	C
S19	C	—	—	—



Appearance of the Ambassador AFM Bookshelf receiver.

Valve	Anode		Screen		Cath.
	V	mA	V	mA	V
V1 ECC85					
a ...	230	7·9	—	—	0·08
b ...	230	14·8	—	—	—
V2 ECH81[1]					
a ...	86	4·9	—	—	1·65
b ...	250	2·0	83	4·6	1·65
V3 EF85	235	8·3	95	2·15	1·4
V4 EABC80					
a-c ...					
d ...	75	0·8	—	—	—
V5 EL84	250	36·0	258	4·0	8·2
V6 EZ80	243[2]	—	—	—	258·0[3]

[1] *Receiver switched to A.M.*
[2] *A.C. reading each anode.*
[3] *Cathode current 73 mA.*

CIRCUIT ALIGNMENT

Equipment Required.—An A.M. signal generator covering 160 kc/s-1.5 Mc/s, 10.7 Mc/s and 88 Mc/s -96 Mc/s; a 0-10 V high resistance D.C. voltmeter; a 0-2.5 V A.C. valve voltmeter; a damping unit consisting of a 470Ω resistor and an 0.002μF capacitor connected in series; a 47kΩ resistor.

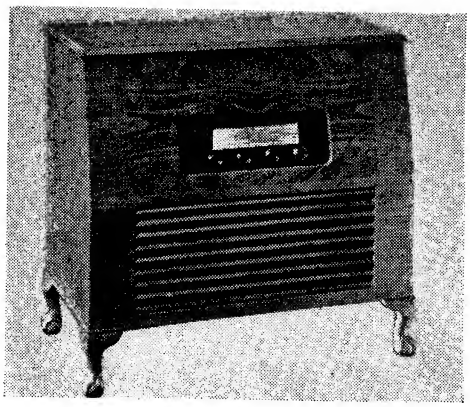
The tuning scale should be removed from the cabinet and placed in position over the control spindles. Check that with the gang at maximum capacitance, the cursor coincides with the diamonds at the high wavelength ends of the tuning scales.

F.M. I.F. Stages

1.—Connect 0-10V meter across **R20,** taking the positive lead to chassis and connecting the negative lead via the 47kΩ resistor to the top of **R20** (location reference G3).
2.—Connect signal generator between chassis and control grid (pin 2) of **V2b,** switch receiver to F.M. Feed in a 30% modulated 10.7 Mc/s signal and adjust output of signal generator to produce a reading of 1 V to 2 V on the output meter.
3.—Adjust the core of **L20** (G4) for maximum output on meter.
4.—Adjust the core of **L21** (C2) for minimum audio output from speaker. This minimum setting should lie between two maximum audio peaks.
5.—Connect damping unit between chassis and control grid (pin 2) of **V3.** Adjust output of signal generator to give a meter reading of 1 V.
6.—Adjust the core of **L16** (G4) for maximum output on meter. Disconnect damping unit.
7.—Connect damping unit between chassis and anode (pin 6) of **V2b.** Adjust the core of **L17** (B2) for maximum output on meter. Remove damping unit.
8.—Transfer signal generator leads to F.M. aerial sockets. Connect damping unit between chassis and control grid (pin 2) of **V2b.** Adjust output of signal generator to give a reading of 1 V.
9.—Adjust the core of **L7** (H4) for maximum output on meter. Remove damping unit.
10.—Connect damping unit between chassis and anode (pin 1) of **V1b.** Adjust the core of **L8** (B2) for maximum output on meter. Remove damping unit.
11.—Repeat operations 3-10 with signal generator output connected to F.M. aerial sockets.
12.—Tune signal generator from 10.5 Mc/s to 10.9 Mc/s and check that the response is symmetrical about the centre frequency of 10.7 Mc/s.

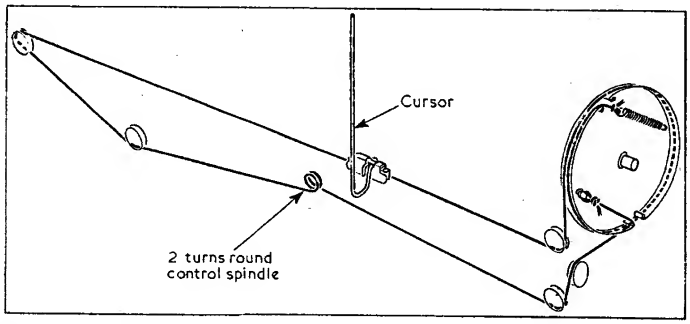
F.M. R.F. and Oscillator Stages

13.—Tune receiver to 88 Mc/s, and with signal generator connected to F.M. aerial sockets, feed in an 88 Mc/s unmodulated signal and adjust cores of **L5** (A2) and **L3** (A2) for maximum output on meter.



Appearance of the Ambassador PRG/AFM.

Sketch of the tuning drive system as seen from the front of the chassis with the gang at maximum.



14.—Tune receiver to 96 Mc/s, feed in an unmodulated 96 Mc/s signal and adjust **C13** (J4) and **C6** (J4) for maximum output on meter.

15.—Connect valve voltmeter between chassis and tapping on **L3** (J4).

16.—Adjust **C9** (J4) for minimum reading on valve voltmeter. Disconnect valve voltmeter.

17.—Repeat operations 13 and 14. Tune receiver to 94 Mc/s, feed in an unmodulated 94 Mc/s signal and adjust the core of **L2** (A2) for maximum output on meter.

18.—Disconnect voltmeter and signal generator.

A.M. I.F. Stages

19.—Switch receiver to M.W. and turn gang to maximum. Connect a shorting link across **C27** (A1).

20.—Connect output of signal generator between chassis and control grid (pin 2) of **V2b.** Feed in a 30% modulated 470 kc/s signal and adjust the cores of **L24** (C2), **L23** (G4), **L19** (B2) and **L18** (G4) for maximum output.

21.—Repeat the adjustments in operation 20 until no further improvement results.

A.M. R.F. and Oscillator Stages

22.—Transfer signal generator leads to **A** and **E** sockets. For all the following operations use a 30% modulated signal.

23.—Feed in a 470 kc/s signal and adjust the core of **L9** (mounted in cabinet) for minimum output.

24.—Switch receiver to L.W. and tune to 1,800m. Feed in a 166.6 kc/s signal and adjust the cores of **L14** (B1) and **L12** (J3) for maximum output.

25.—Tune receiver to 1,200m., feed in a 250 kc/s signal and adjust **C30** (B1) and **C19** (A1) for maximum output.

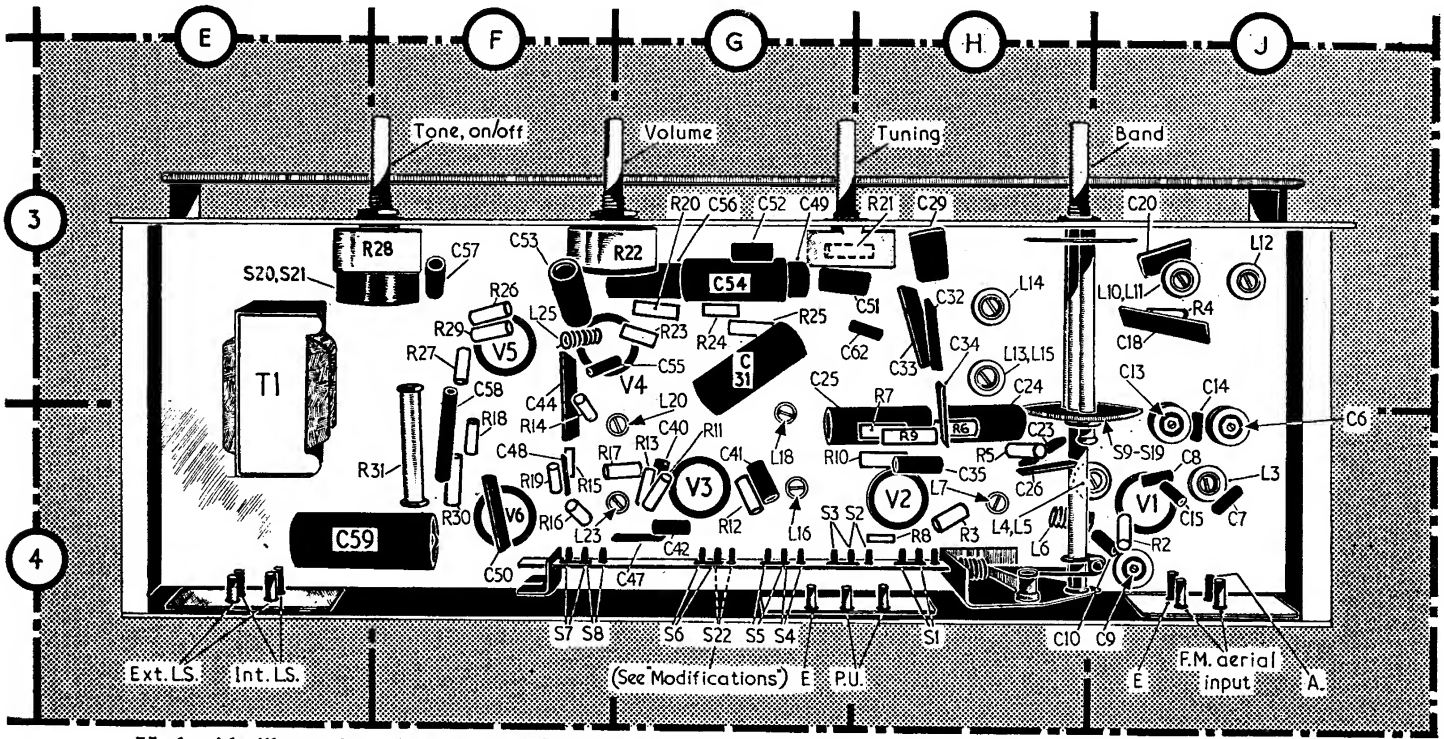
26.—Repeat operations 24 and 25 until no further improvement results.

27.—Switch receiver to M.W. and tune it to 500m. Feed in a 600 kc/s signal and adjust tae cores of **L13** (B2) and **L11** (J3) for maximum output.

28.—Tune receiver to 200 m, feed in a 1,500 kc/s signal and adjust **C28** (B1) and **C21** (A1) for maximum output.

29.—Repeat the adjustments in operations 27 and 28 until no further improvement results.

ADDITIONAL NOTES AND MODIFICATIONS



Underside illustration of chassis. The A.M./F.M. change-over switch contacts are identified in F4, G4, H4.

Printed in England by Cornwall Press Ltd., Paris Garden, London, S.E.1.